



Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire

Canada



# Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada:

# 2021



## CNSC Staff Presentation

Commission Meeting

December 16, 2022

CMD 22-M35.A

e-Doc 6865354.pptx


e-Doc 6929974 (PDF)



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# Presentation Outline

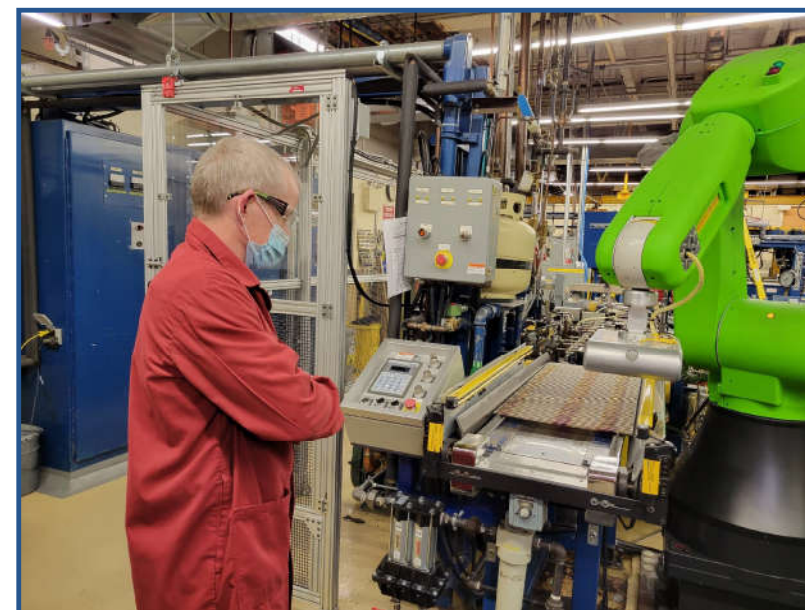
- Overview
- Facility Types
- Key Facility Highlights
- CNSC Staff Assessment
- Indigenous Consultation and Engagement
- Public Engagement
- Key Themes from Interventions
- Conclusions

 Canadian Nuclear Safety Commission / Commission canadienne de sûreté nucléaire	
UNPROTECTED/NON PROTÉGÉ	
ORIGINAL/ORIGINAL	
CMD: 22-M35	
Date signed/Signé le : 15 AUG 2022	
Regulatory Oversight Report	Rapport de surveillance réglementaire
<b>Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada: 2021</b>	<b>Rapport de surveillance réglementaire des installations de traitement de l'uranium et des substances nucléaires au Canada: 2021</b>
Public Meeting	Réunion publique
Scheduled for: December 15 or 16, 2022	Prévue pour : 15 ou 16 décembre 2022
Submitted by: CNSC Staff	Soumis par : Le personnel de la CCSN
e-Doc 6795558 (WORD) e-Doc 6850909 (PDF)	



# Overview

- CNSC's regulatory efforts:
  - Uranium and Nuclear Substance Processing Facilities (UNSPF) 2021
- Overviews of licensing and compliance verification activities across similar facilities
- Ratings for all 14 Safety and Control Areas, with detailed performance reporting on:
  - Radiation Protection
  - Environmental Protection
  - Conventional Health and Safety



*CNSC staff during site tour at BWXT Peterborough  
Source: CNSC*



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# UNSFP ROR Changes – 2021

## Indigenous Matters

- Land acknowledgements added for each facility
- Indigenous consultation and engagement made a stand-alone section
- Collaborative reporting on long-term engagement activities with Indigenous Nations and communities is provided

## Analysis

- Uranium in urine analysis results for nuclear energy workers are included for relevant facilities



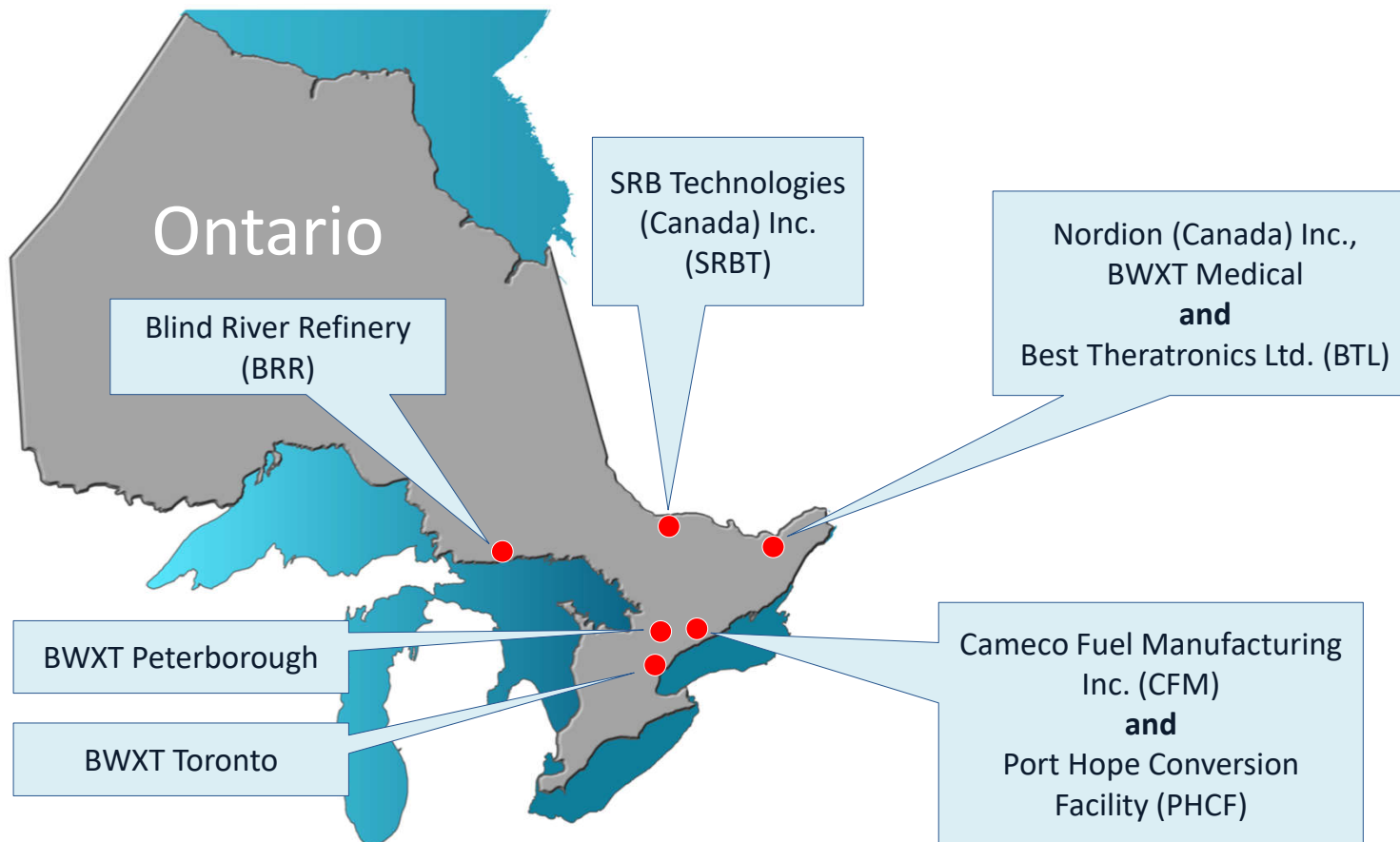
Curve Lake representatives joined IEMP sampling team at BWXT Peterborough in 2021

Source: CNSC



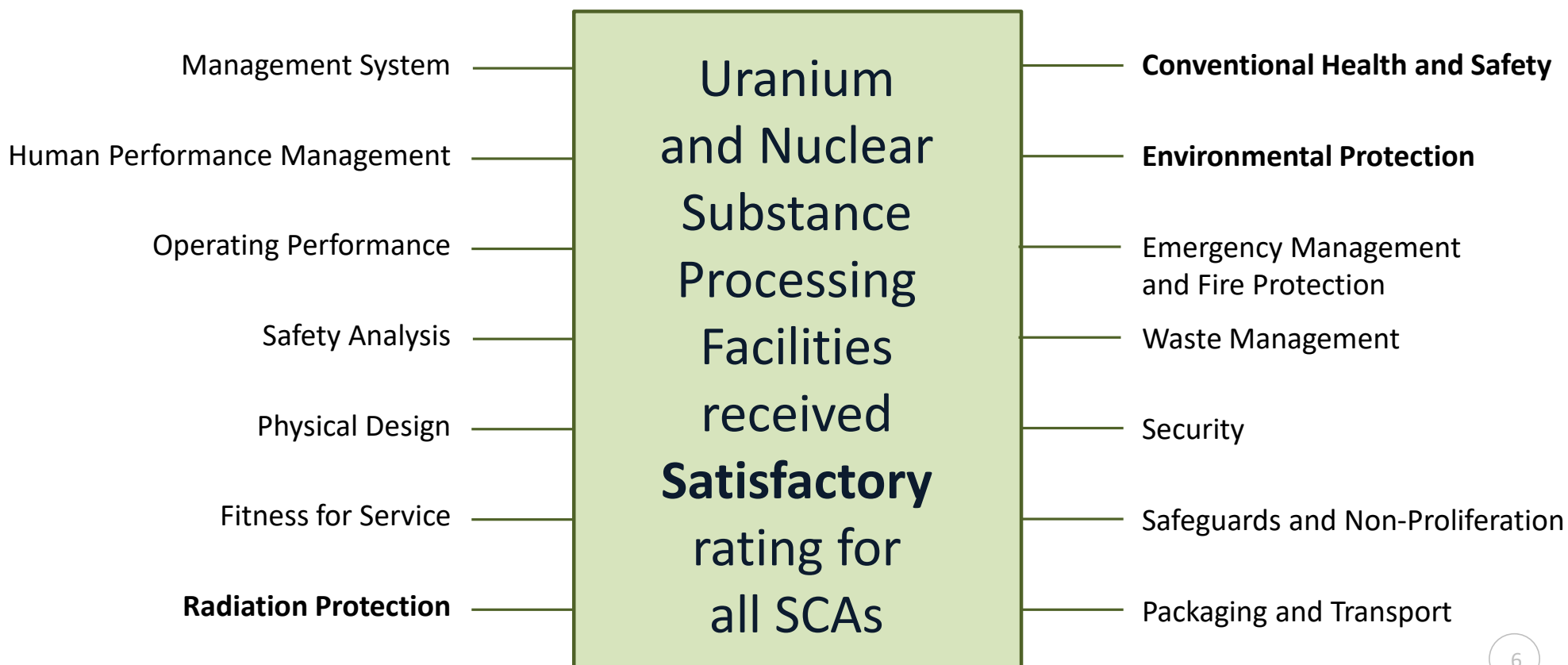
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# Uranium and Nuclear Substance Processing Facilities





# Safety and Control Areas (SCA)





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# Facility Highlights: Inspections

Licensee	Inspections (Notice of Non-compliance)	Safety Significance of Notice of Non-compliance	CNSC-led Safeguards Inspections	IAEA-led Safeguards Inspections
Blind River Refinery	2(9)	Medium (2); Low (7)	0	7
Port Hope Conversion Facility	4(15)	Low	0	10
Cameco Fuel Manufacturing	2(9)	Low	0	4
BWXT Toronto	1(1)	Low	1	4
BWXT Peterborough				4
SRB Technologies	3(1)	Low	0	0
Best Theratronics Limited	1(0)	Low	0	0
<b>Total</b>	<b>13(35)</b>		<b>1</b>	<b>29</b>

Note: Inspections were not conducted at Nordion and BWXT Medical in 2021



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# Facility Highlights: Reporting and Licensing

Licensee	Reportable Events	Action Level Exceedances	Regulatory Limit Exceedances	Licensing Decisions
Blind River Refinery	2	0	0	0
Port Hope Conversion Facility	6	9	0	0
Cameco Fuel Manufacturing	0	1	0	0
BWXT Toronto	1	0	0	0
BWXT Peterborough	1	0	0	0
SRB Technologies	2	0	0	0
Nordion	7	0	0	0
BWXT Medical	2	0	0	1
Best Theratronics Limited	1	0	0	0
<b>Total</b>	<b>22</b>	<b>10</b>	<b>0</b>	<b>1</b>





# Independent Environmental Monitoring Program (IEMP)

CNSC staff sample air, water, soil, vegetation, and local food to independently verify that the communities and the environment are protected.

In 2021, CNSC staff conducted IEMP sampling in communities near 2 UNSPF facilities:

- [BWXT Peterborough \(Peterborough, ON\)](#)
- [SRB Technologies \(Pembroke, ON\)](#)

**Environment and local communities are protected from releases from these facilities**



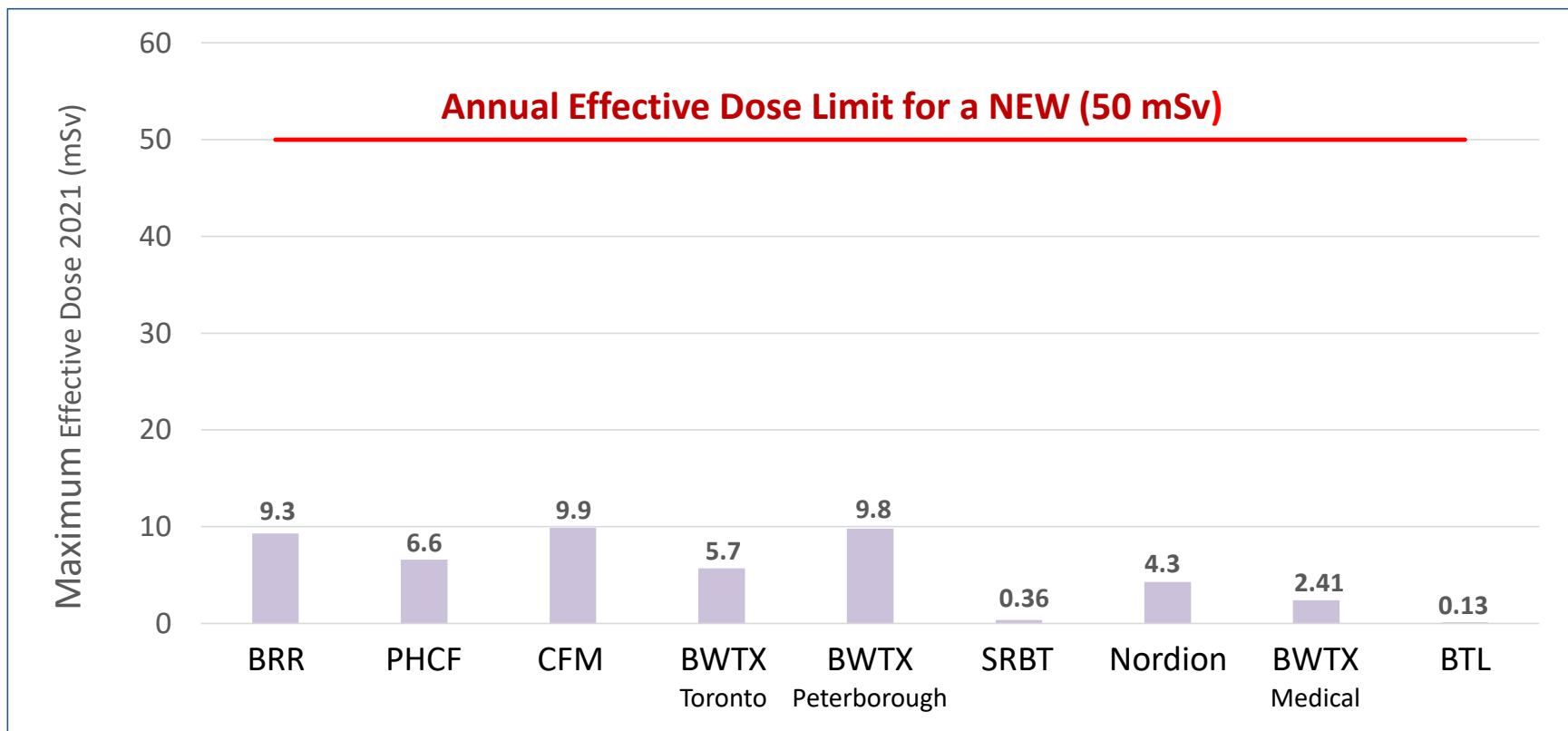
CNSC staff taking a soil sample near the SRB Technologies facility in 2021  
Source: CNSC



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# Radiation Protection Performance (1)

## Maximum Doses to Nuclear Energy Workers (NEWs)





# Radiation Protection Performance (2)

## Uranium in Urine Analysis

- Included in the ROR as a result of direction from the Commission in the BRR Record of Decision
- Reported on for NEWs from the Uranium Processing Facilities (PHCF, BRR, CFM and BWXT Toronto and Peterborough)
- Five years of urine analysis results reported (2017-2021)
- No action level exceedance for uranium in urine was reported in 2021

**Workers are protected from uranium exposure**



# Radiation Protection Action Level Exceedance (1)

## June 2021 – Cameco Fuel Manufacturing

- Lung dose of 5.9 mSv; exceeded annual action level (5 mSv)
- Regulatory dose limit (50 mSv/ year)
- Respiratory protection use during a specific work activity was not included in the work instruction as a requirement
  - It was also not part of workers' training and supervisors' oversight activities
- Corrective actions were implemented, including:
  - Updating the work instructions for this work activity to include the respirator requirement
  - And communicating this requirement to workers and supervisors



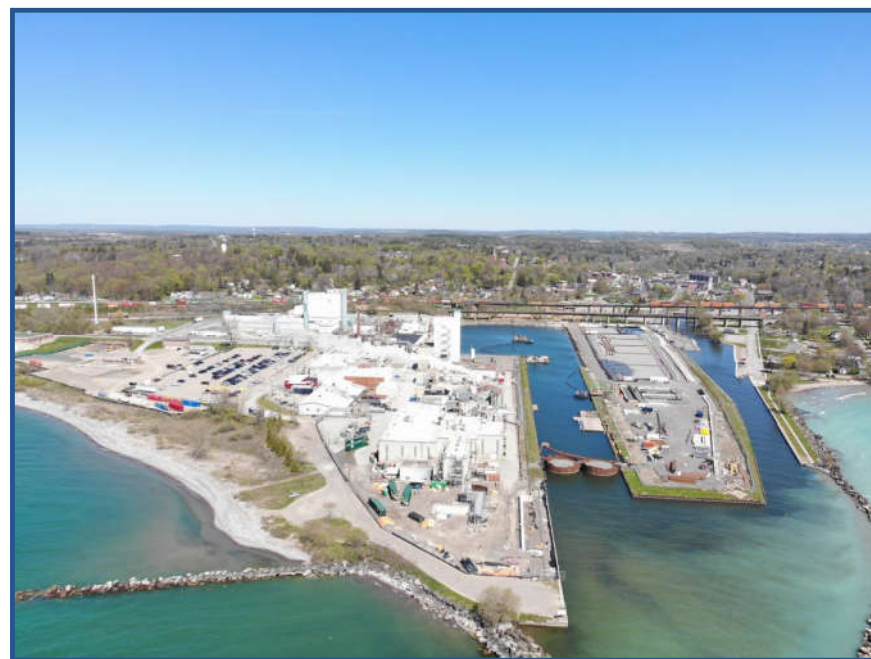
Robot inserting rods into fuel bundle assembly at Cameco Fuel Manufacturing  
Source: Cameco



# Radiation Protection Action Level Exceedance (2)

## Nov. 2021 – Port Hope Conversion Facility

- Whole-body dose of 2 mSv; reached monthly action level (2 mSv)
- Regulatory dose limit (50 mSv/ year)
- Worker performed work activities with the potential for increased external radiation exposures
- Corrective actions were implemented, including:
  - Updating the work instructions for these work activities to include the use of direct reading dosimeters to track radiation doses in real-time



Aerial image of Port Hope Conversion Facility  
Source: Cameco



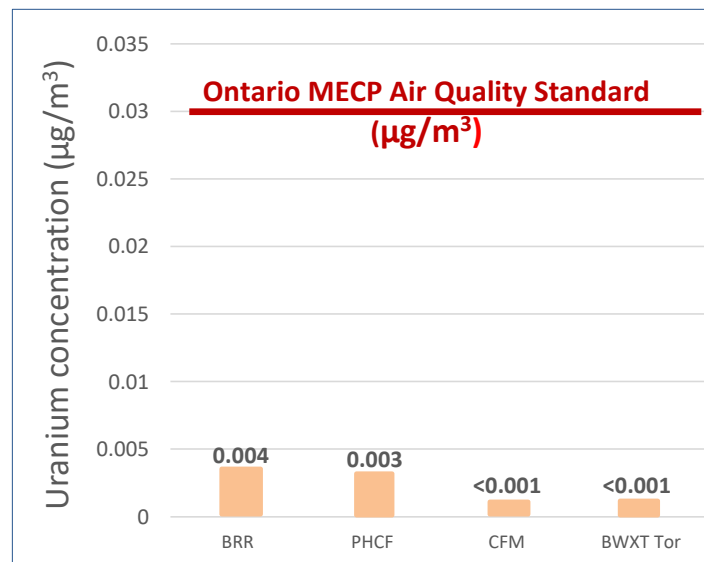
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# Environmental Protection Performance (1)

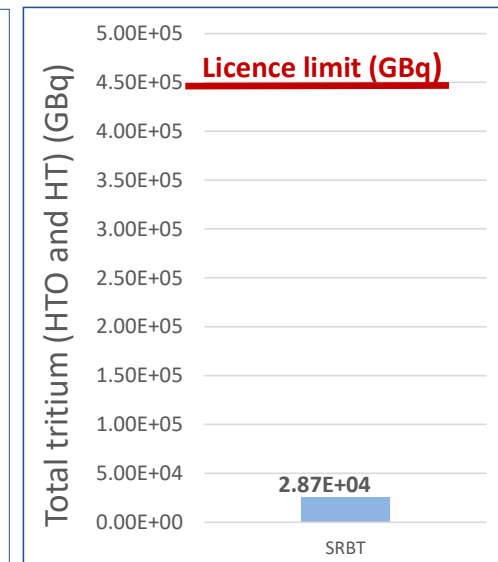
## Annual Releases from UNSPF (2021)

- Direct releases from the UNSPF are primarily limited to atmospheric releases:
  - **Uranium** (BRR, PHCF, CFM, and BWXT-Toronto and Peterborough)
  - **Tritium** (SRBT)
- Negligible releases at Nordion and BTL

### Uranium in ambient air



### Tritium releases



Releases were well below regulatory limits

## Slide 14

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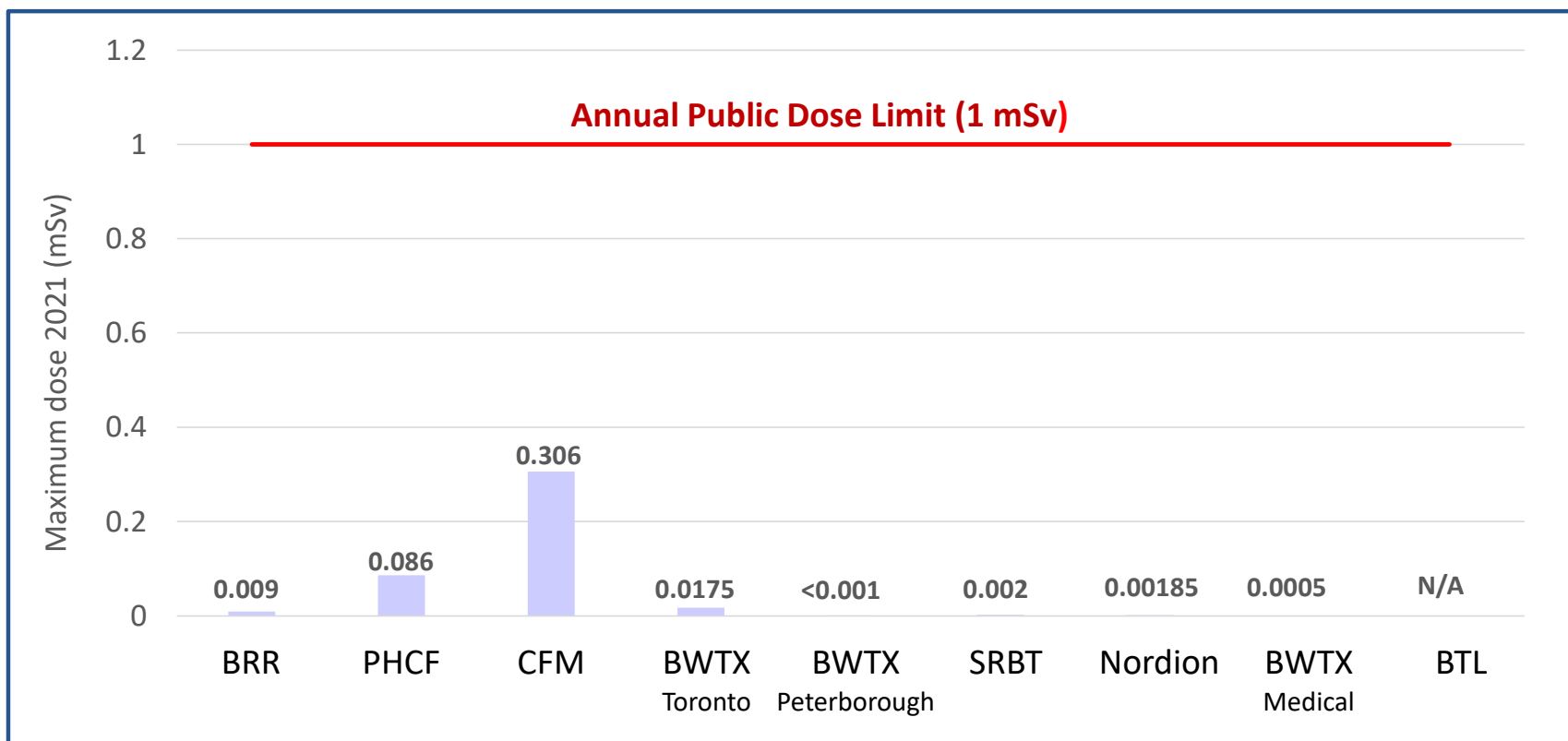
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# Environmental Protection Performance (2)

## Maximum Doses to Public







# Environmental Protection Action Level Exceedance

## Oct./Nov. 2021 – Port Hope Conversion Facility

- 7 exceedances above 100 µg/L for the daily composite sample uranium result from the combined facility discharge
- Occurrences were attributed to groundwater infiltration from heavy precipitation events
- Cameco has implemented corrective actions and are continuing to repair and upgrade sections of the sanitary sewer network as part of the Vision in Motion project



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# Conventional Health and Safety

## Lost-time injuries (LTIs):

- Injury that results in the worker being unable to return to work for a period of time
- Key performance indicator for conventional health and safety

Facility	LTI	Reportable Event Highlights
<b>BWXT Peterborough</b>	1	Worker handling pneumatic piping experienced a back pain and stiffness executing a non-licensed activity resulting in two days of lost time
<b>BWXT Medical</b>	1	An employee overexerted their arm attempting to open a hot cell door incorrectly, resulting in three days of lost time.

**Licensees maintained effective oversight of health and safety of workers**



# Conventional Health and Safety Action Level Exceedance

## Aug. 2021 – Port Hope Conversion Facility

- Urine analysis found 8.3 mg fluoride per litre; exceeded action level (7 mg F/L)
- Worker performed significant amount of welding, using welding rods containing calcium fluoride, and worker removed their respirator periodically during welding activities
- Corrective actions included a stand-down with the contracted workers to share lessons learned and to reinforce the importance of wearing a respirator. Extra ventilation in the work area was deployed and signage posted to remind workers that respirator usage is mandatory



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# Indigenous Consultation and Engagement

## Work done specific to Commission hearing/meeting processes:

- 2020 Regulatory Oversight Report
- 2021 BWXT Medical licence application
- 2021 BRR licence renewal
- 2022 CFM 1-year licence renewal
- 2022 SRBT licence renewal

## General and Commission proceeding-related activities:

- Notifying about the application and opportunities to participate
- Virtual meetings and webinars
- Continued to monitor and assess Licensee engagement activities and programs
- Collaboration on environmental monitoring activities
- Development of Terms of Reference for Long-Term Engagement
- Follow up on previous interventions and recommendations

Terms of Reference for Long-term Engagement Signed with:
Curve Lake First Nation
Mississaugas of Scugog Island First Nation
Kebaowek First Nation
Métis Nation of Ontario
Algonquins of Pikwakanagan First Nation

## Slide 19

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**MA0** ADD AOPFN to Slide and SN.  
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# Public Engagement

In 2021, engagement activities included:

- Virtual webinars related to:
  - Blind River Refinery licence renewal
  - BWXT Medical licence application
- Sharing information through mail drops, CNSC website, social media channels, annual regulatory reports, and dashboards
- Engagement activities related to BWXT Peterborough

**CNSC is committed to disseminate information and provide opportunities for discussion**





# Public Engagement: BWXT Peterborough

## Extended air sampling in 2022 near the facility for beryllium:

- Sampling plan/approach done in consultation with Dr. Aherne (Associate Professor, Trent University)
- Three locations sampled, including the Prince of Wales Public School
- Initial results indicate beryllium levels 1800 times below air quality standard
- Analyses are ongoing and results will be disseminated in the future



Additional air monitoring in BWXT Peterborough. *Source: CNSC*

**Human health and the environment remain protected in Peterborough**



# Interventions: Key Themes

## Indigenous consultation and engagement

- Further engagement and consultation on licensed activities and regulatory oversight (e.g., ROR reporting, community engagement, sampling campaigns)
- Greater transparency and information sharing (e.g., reportable events, operations, regulatory oversight)
- Additional capacity funding to support further engagement and collaboration
- Increased inclusion of Indigenous Knowledge

## Content and scope of ROR

- Expanded scope of assessment and reporting in the ROR

Participant Funding Program Recipients
Algonquins of Pikwakanagan First Nation
Curve Lake First Nation
Kebaowek First Nation
Nuclear Transparency Project





## Errata

- **Section 3.1.1**, page 13, the year in the licence number for SRBT should be 2034 and not 2037
- **Table H-1**, page 73, public dose estimate value for BWXT Medical should be 0.0005 mSv and not 0.109 mSv
- **Table I-1**, page 75, unit for “particulate” parameter for BRR should be “g/h” and not “kg/h”, and corresponding licence limit should be 11, 000 g/h and not 11 kg/h
- **Pages 82 & 83**, 18 of 26 vegetation samples taken from near PHCF had fluoride concentrations below the laboratory's detection limit of 5 ug/g, not 16 of 26 samples
- **Page 85**, value for uranium in air for CFM should be 0.0004  $\mu\text{g}/\text{m}^3$ , not 0.0056  $\mu\text{g}/\text{m}^3$
- **Appendix L**, page 117, total number of reportable events for BTL and PHCF should be 1 and 6, respectively. The total number of events were 22 and not 21

**The errata do not impact the conclusions of the ROR**



# Safety Performance Conclusions

## **CNSC staff confirm that licensees operating uranium and nuclear substance processing facilities in 2021:**

- Maintained radiological doses to workers and the public well below regulatory limits
- Continued to protect the public and environment through environmental protection programs
- Continued to protect workers with conventional health and safety programs
- Continued to effectively implement programs in support of all SCAs
- Addressed all areas of non-compliance in a timely manner

**CNSC staff are satisfied that licensees continue to protect the health and safety of workers, public and the environment**



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